

Safety Evaluation by the DOE Regulatory Unit (RU)
Of Proposed Authorization Basis Amendment Request
ABAR-W375-00-00003, Revision 0
"Credit for Facility Worker Evacuation"
(DOE Contract DE-AC27-96RL13308)

1. INTRODUCTION

The River Protection Project Waste Treatment Plant (RPP-WTP), formerly the Tank Waste Remediation System-Privatization (TWRS-P), facility that will treat and vitrify radioactive waste at the Hanford Site is described in the above referenced contract. The authorization basis for RPP-WTP requires the Contractor, BNFL Inc., to maintain a Safety Requirements Document (SRD). The SRD defines the standards used by the contractor to design, construct, and operate the facility. The standards are directed toward control of radiological, nuclear, and process hazards such that adequate protection is provided to workers, the public, and the environment.

By letter dated April 12, 2000, the Contractor submitted an Authorization Basis Amendment Request (ABAR) proposing a number of changes to Appendix A and B of SRD Volume II. Such submittals are required in accordance with the requirements of RL/REG-97-13, *Regulatory Unit Position on Contractor Initiated Changes to the Authorization Basis*, Revision 6. The purpose of the ABAR is to explicitly allow credit for administrative controls (including evacuation) to protect facility workers, when appropriate, even without engineered controls such as structures, systems and components (SSCs) important to safety.

2. BACKGROUND

Appendix A and B of the BNFL SRD establishes an approach to designating the severity level (SL) for unmitigated accident sequences. The approach did not explicitly allow credit for administrative controls such as evacuation in the evaluation of the frequency of the accident sequence. The ABAR proposes for administrative controls alone to be credited as the controls to protect facility workers only for low severity events (e.g., SL-4), as appropriate. Timely evacuation from the vicinity of the hazard is considered to be an administrative control. Administrative controls alone would not be relied on for the purpose of protecting the public and co-located workers.

3. EVALUATION

The RU reviewed the BNFL proposal to explicitly credit administrative controls (including evacuation) in control strategies to protect facility workers. The BNFL proposal provided an evaluation to demonstrate that the revised SRD will continue to identify a set of standards that will provide adequate safety, comply with all applicable laws and regulations, and conform to the top-level safety standards. An evaluation of each specific change to the SRD is provided in Appendix A to this enclosure. The proposed ABAR:

- Identifies SRD Safety Criteria 1.0-7 and 4.1-1 as being potentially impacted.
- States that the revision has no impact on ... the need for facility design to account for the range of operational conditions from normal operations through postulated accidents.
- States that administrative controls would be relied upon exclusively only for low severity events (e.g., SL-4).
- States that administrative controls alone (including evacuation) may be credited ... in control strategies ... [provided] such credit must be justified; this includes demonstrating that the strategy meets the applicable target frequency for the hazard severity level.
- States that [some] SSCs typically will serve to alert facility workers of a hazardous situation [and] these SSCs may be alarms, sirens, public address systems, etc.

3.1 Evaluation Against Applicable SRD Safety Criteria

The BNFL proposal indicated that the revisions could potentially impact Safety Criteria 1.0-7 and 4.1-1. Safety Criteria 1.0-7 and 4.1-1 are as follows:

Safety Criterion 1.0-7: To compensate for potential human and equipment failures, a defense-in-depth strategy shall be applied to the facility commensurate with the hazards; such that, as appropriate to control the risk, safety is vested in multiple, independent safety provisions, no one of which is to be relied upon excessively to protect the public, the workers, or the environment. This strategy shall be applied to the design and operation of the facility.

Safety Criterion 4.1-1: The facility design shall provide for the prevention and mitigation of the risks associated with radiological and chemical material inventories and energy sources. The facility design shall include consideration of normal operation (including startup, testing and maintenance), anticipated operational occurrences, external events, and accident conditions.

Prevention shall be the preferred means of achieving safety.

Defense-in-depth shall be applied commensurate with the hazard to provide multiple physical and administrative barriers against undue radiation and chemical exposure to the public and workers.

The RU reviewed the BNFL proposal and determined that the revision does not challenge the Safety Criteria. Key points considered by the RU in the determination that the Safety Criteria are met by the modification include the statements in the proposed ABAR. These include that "BNFL Inc. does not intend to rely excessively on administrative controls to protect facility workers" and that "administrative controls would be relied upon exclusively only for low severity events (e.g., SL-4.)" In their evaluation, BNFL concluded that "This revision has no impact on prevention being the preferred means of achieving safety, nor with the need for the facility design to account for the range of operational conditions from normal operations through

postulated accidents." The RU concluded that the BNFL proposed ABAR is consistent with Safety Criterion 1.0-7; the use of administrative controls is considered part of a defense-in-depth program. Relying on administrative controls exclusively only for low severity events SL-4 is appropriate and commensurate with the potential hazard. The RU concluded that the BNFL ABAR is consistent with Safety Criterion 4.1-1. The ABAR provides for prevention as the preferred means of achieving safety and applies defense-in-depth commensurate with the hazard.

3.2 Adequate Safety

The BNFL proposal states that the SRD standards will continue to provide adequate safety. The RU reviewed the BNFL proposal and determined that the justification for the changes constituting the revision provide a basis for maintaining adequate safety. Key points considered by the RU in the determination that adequate safety is maintained given the proposed ABAR changes include the statements in the ABAR that relate to the use of administrative controls and the adequacy of design safety features. These statements include that "although BNFL Inc.'s preferred approach is to provide design safety features that do not require operator action to limit worker exposure in the event of an accident, where such features are not practical, control strategies may credit specific administrative controls, when appropriate, to provide adequate protection and limit facility worker exposure" and "administrative controls alone (including evacuation) may be credited in lieu of SSCs in control strategies that protect facility workers." It is important that the BNFL proposal states that "Such credit [for administrative controls] must be justified; this includes demonstrating that the strategy meets the applicable target frequency for the hazard severity level." Given the statements in the ABAR justifying the changes to the SRD, the RU concluded that the BNFL approach described in the ABAR maintains adequate safety.

3.3 Compliance With All Applicable Laws and Regulations

The BNFL proposal states that 10 CFR 835 does not address the use of administrative controls in control strategies that protect workers from accident conditions. The proposal states "Although 10 CFR 835 does address administrative controls that protect workers against radiological hazards from normal operation, this revision is not concerned with such administrative controls. The RU disagrees with the BNFL evaluation. The RU observes that 10 CFR 835 does not address the use of administrative controls in control strategies that protect workers from accident conditions provided the accident condition has an annual frequency less than 10^{-2} . However, the application of administrative controls to protect workers is regulated by 10 CFR 835 for the conduct of both normal activities and anticipated events. Section 835.101(d) specifies the regulation's applicability to anticipated operational tasks. In the BNFL SRD, anticipated events are defined as those with an annual frequency greater than 10^{-2} and less than 10^{-1} . For this reason, BNFL must apply their Radiation Protection Program (RPP) to control strategies for event sequences with an annual frequency greater than 10^{-2} , but less than 10^{-1} . Such consideration would address compliance with Subpart K of 10 CFR 835; these requirements govern design and control. It is important that the BNFL proposal does not change the requirement that BNFL meet the RPP requirements including that contained in Section 5.5.10.1. This section addresses compliance with 835.1001(a), which states that: "...The primary methods used shall be physical design features (e.g., confinement, ventilation, remote handling, and shielding). Administrative controls shall be employed only as supplemental methods to control radiation exposure."

Although the RU disagrees with the BNFL evaluation that administrative control strategies for anticipated events are not required to be evaluated by 10 CFR 835 this error in BNFL's evaluation does not adversely affect acceptance of the proposed ABAR because BNFL has not changed the RPP requirement that the use of administrative controls shall be employed only as supplemental methods to control radiation exposure.

The requirements in Subpart K of 10 CFR 835 address the use of physical design features and administrative controls. The rule requires that the primary methods used to control occupational radiation exposure shall be physical design features (e.g., confinement, ventilation, remote handling, and shielding). In addition, administrative controls shall be employed only as supplemental methods to control radiation exposure. The BNFL proposed ABAR is consistent with the 10 CFR 835 requirements in Subpart K. The ABAR states that administrative controls alone (including evacuation) may be credited in control strategies for low severity SL-4 events provided such credit is justified. BNFL will rely on administrative controls alone for low severity SL-4 events and still achieve compliance with the requirements of Subpart K provided the control strategy is assessed as to why physical design features are not possible or justified.

3.4 Conformance to Top-Level Standards

The BNFL proposal concludes that the Top-Level Standards are not affected by the proposed revision. BNFL's conclusion is based on their approach that requires the credited administrative control to be justified and considers the reliability of credited administrative controls. The RU reviewed the BNFL proposal and determined that the justifications for the changes constituting the revision provide a basis for demonstrating conformance to the Top-Level Standards. The RU concluded that the Top-Level Standards did not prohibit the use of administrative controls alone for low severity SL-4 events; the BNFL requirement to provide justification for credited administrative controls supports the approach and provides documentation of the selection of appropriate control strategies.

3.5 Consistency Within the SRD

The changes to the SRD identified by BNFL in the proposed ABAR were not sufficient to result in an SRD that would be consistent in approach. The RU noted that SRD Vol. II, Appendix B, Table 1 (page B-14), requires SL-4 events to have a control strategy that includes "at least one physical barrier." This requirement is inconsistent with the ABAR that proposes, as appropriate, to allow administrative controls alone as the control strategy for a low severity SL-4 event. A change to the SRD Vol. II, Appendix B, Table 1, SL-4 entry is required to provide for consistency with the proposed ABAR. For consistency, the RU would find it acceptable to revise the SL-4 entry in Table 1 from "at least one physical barrier" to "physical design features and/or administrative controls per 10 CFR 835.1001."

3.6 Consistency With Other Submittals

The BNFL proposal is to credit administrative controls in the control strategies to protect facility workers, when appropriate. Such an approach is acceptable when justified by the accident analysis conditions and assumptions. The RU noted that the current BNFL accident dose methodology does not prohibit using a duration of exposure for a facility worker that could

account for the individual evacuating the area, provided the estimated duration exposure were justified. The RU review determined the BNFL proposal is consistent with their current dose assessment methodology.

4. CONCLUSION

The RU has concluded that the BNFL proposed ABAR has demonstrated reasonable assurance that the health and safety of the public and the workers will not be endangered by the proposed amendments and the proposed amendments will not have a significant effect on the environment. The proposed amendments have been evaluated and determined to fully comply with contractual and regulatory requirements.

However, as described above, the RU disagrees with statements made in the BNFL evaluation of compliance with 10 CFR 835. The RU evaluation of the proposed changes indicates that the ABAR does not change BNFL's requirements affecting compliance to 10 CFR 835. The RU has indicated that the entry for SL-4 events in Table 1 of Appendix B of the SRD also needs to be changed for consistency with other proposed changes to the SRD. The RU determined that the proposed ABAR is consistent with BNFL's current dose assessment methodology.

Appendix A
Detailed Evaluation of ABAR-W375-00-00003
Credit for Facility Worker Evacuation

The purpose of this appendix is to document the detailed examination of the changes proposed by ABAR-00-00003 and the rationale for acceptance or rejection of the changes. The appendix is organized by individual change, beginning with the proposed changes to the Safety Requirements Document (SRD). Specifically, BNFL proposes the following revisions to Appendix A and B of the SRD.

Appendix A

Change - The following sentence is added to the last paragraph of Section 5.0, Development of Control Strategies (page A-12):

"Notwithstanding the foregoing guidance on control strategy selection, administrative controls alone may be credited as the controls that protect facility workers, when appropriate. Timely evacuation from the vicinity of the hazard is considered to be an administrative control."

Acceptability - The proposed addition to the SRD Appendix A is consistent with the justification provided in the BNFL evaluation of the proposed ABAR and has been determined to be acceptable.

Appendix B

Change - The last sentence of Administrative Controls is revised from:

"Administrative Controls alone shall not be relied on for the implementation of defense in depth."

To:

"For purpose of protecting the public and co-located workers, Administrative Controls alone shall not be relied on for the implementation of defense in depth. Administrative controls alone may be credited as the controls that protect facility workers, when appropriate. In such cases, defense in depth is provided through other human aspects, such as worker qualification and training."

Acceptability - The proposed change to the SRD Appendix B is consistent with the justification provided in the BNFL evaluation of the proposed ABAR and has been determined to be acceptable. The term "when appropriate" is supported by the BNFL commitment to provide justification when administrative controls are credited in lieu of SSCs in control strategies (ABAR-W375-00-00003, Rev. 0, Attachment 1, P. 3.)

Change - In the third paragraph of Section 3.0, Determination of SSCs for the Implementation of Defense in Depth, the sentence:

"Therefore, while SSCs are always part of the control strategy for defense in depth..."

is revised to read:

"Therefore, while SSCs are always part of the control strategies that protect the public and co-located workers ..."

Acceptability - The proposed revision to the SRD Appendix B is consistent with the justification provided in the BNFL evaluation of the proposed ABAR and has been determined to be acceptable.

Change - In the same section, a new sentence is added after the first sentence of paragraph 2 of 3rd Column – Target Frequencies (yr⁻¹) stating:

"When appropriate, administrative controls alone may be credited as the controls that protect facility workers."

Acceptability - The proposed addition to the SRD Appendix B is consistent with the justification provided in the BNFL evaluation of the proposed ABAR and has been determined to be acceptable. The term "When appropriate" is supported by the BNFL commitment to provide justification when administrative controls are credited in lieu of SSCs in control strategies (ABAR-W375-00-00003, Rev. 0, Attachment 1, P. 3.)

Change - The second sentence from the end of paragraph 1 of the same section is revised from:

"No credit is taken for administrative controls in calculating the event frequency."

To:

"No credit is taken for administrative controls in calculating the initiating event frequency."

Acceptability - The proposed revision to the SRD Appendix B is consistent with the justification provided in the BNFL evaluation of the proposed ABAR and has been determined to be acceptable.